

REMARKS

Claims 1-5, 7-11 and 14-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,150,426 to Curtin et al in view of U.S. Patent 3,085,083 to Schreyer. Further, claims 1-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over WO 2004/018527 to Tatemoto et al (with citation to U.S. 2005/0228127 A1) in view of Schreyer.

Applicants traverse, and respectfully request the Examiner reconsider for the following reasons.

The fluoropolymer of present claim 1 contains acid/acid salt groups and has -CF₂H groups at polymer chain terminals.

The fluoropolymer of claim 1 is stable and is particularly suitable for use in the field of solid polymer electrolyte fuel cells and in other fields where stability is required. See page 27, lines 11-14 of the specification.

The result of stability testing using Fenton's reagent reveals the effect of the invention. See page 25, lines 17-21 and page 27, lines 5-8 of the specification.

Investigators in the field of polymers containing acid/acid salt groups believe that -CF₂H group is an unstable functional group resulting in the problem of gradual polymer decomposition. The state of the art is disclosed in paragraph [0004] of U.S. 2006/063903 and paragraph [0018] of U.S. 2006/0287497.

Paragraph [0004] of U.S. 2006/0063903 A1 is reproduced below:

However, a perfluorinated polymer having sulfonic groups to be used as a polymer contained in a membrane and an electrode usually has unstable functional groups such as -COOH groups, -CF=CF₂ groups, -COF groups and -CF₂H groups at some molecular chain terminals, and therefore, there was such a problem that a polymer gradually decomposes during long-term fuel cell

operations, followed by decreasing the power generation voltage. In addition, there was such a problem that the fuel cell operation cannot be conducted because decrease of the mechanical strength due to the polymer decomposition, locally causes pinholes, breaking, abrasion or the like.

Paragraph [0018] of U.S. 2006/0287497 is reproduced below:

The present inventors considered that since a linear perfluoropolymer having sulfonic acid groups which has been commonly used for fuel cells, has unstable functional groups such as -COOH groups, -CF=CF₂ groups, -COF groups and -CF₂H groups at same molecular chain terminals, such a polymer gradually decomposes during long-term operation when used for an electrolyte material for polymer electrolyte fuel cells, whereby the power generation voltage decreases and the membrane strength decreases to locally cause pinholes, breaking, abrasion or the like, and they have found that the durability can be greatly improved by fluorinating (contacting with fluorine gas) such a polymer so as to stabilize the molecule terminals by perfluorination. However, in a case where the polymer was exposed to severe operation conditions, such durability was not good enough. Accordingly, they have conducted a further study for improvement of the durability, and as a result, have found that the durability can be remarkably improved by fluorinating a polymer having alicyclic structures in its main chain and further having sulfonic acid groups, as compared with the durability improved by fluorinating the conventional polymer.

However, contrary to the conventional belief of investigators in this field of art, the present inventors found that the fluoropolymer of claim 1 containing acid/acid salt groups and having -CF₂H groups at polymer chain terminals tolerates Fenton's reagent (i.e., OH radicals) to thereby achieve the present invention.

Turning to the cited prior art, Curtin et al and Tatemoto et al, primarily relied upon in the above two prior art rejections, disclose no polymer-containing acid/acid salt groups and having -CF₂H groups at polymer chain terminals as required by present claim 1.

Schreyer does not disclose that polymers having -CF₂H groups have resistance to OH radicals. Schreyer only teaches thermal stability of copolymers having no acid/acid salt groups. See col. 1, lines 70-71.

Therefore, there is no teaching or suggestion in the cited prior art which would lead one of ordinary skill to modify the fluoropolymers of Curtin et al or Tatemoto et al (having an acid/acid salt group) with the end groups taught by Schreyer (disclosing fluorocarbon polymers having no acid/acid salt groups).

For the above reasons, it is respectfully submitted that the present claims are patentable over the cited prior art, and withdrawal of the foregoing rejections under 35 U.S.C. § 103(a) is respectfully requested.

Withdrawal of all rejections and allowance of claims 1-17 is earnestly solicited.

In the event that the Examiner believes that it may be helpful to advance the prosecution of this application, the Examiner is invited to contact the undersigned at the local Washington, D.C. telephone number indicated below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



Abraham J. Rosner
Registration No. 33,276

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

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